

As a recent incarnation, or "last-joined" saint, he invested the Dalai lama with a complete suit of bishop's canonicals. Perhaps this recognition of a certain analogy between the two Governments is not quite so inappropriate as it at first appears.

Mr. Landon concludes his delightful book with an expression of his opinion that the doors of Lhasa are once again closed to the European. Not again (according to our author) for many a long year will any Englishman watch for the flashing cupolas of the Potala from the banks of the Kyi Chu, or penetrate into the inner sanctuary of the everlasting Jo. With this view of the future of Tibet we can hardly agree. By his own showing there is quite enough of uncertainty, even in the present political situation, to warrant the making of a straight road over the Himalayan passes with as little delay as possible; and it should not be forgotten that the right of way to Gyantse is already secured.

T. H. H.

#### THE TREATMENT OF CANCER WITH RADIUM.

THE discovery of radium was speedily followed by its use in the treatment of cancer, and it was hoped that at last a remedy had been found for this terrible disease. Great interest has been aroused by a recent report in a contemporary of a case of cancer which has been successfully treated by this agent. The case appears to be undoubtedly one of cancer, as the patient was carefully examined before, during, and after treatment by competent authorities; but the report of cure must be accepted with caution. We are informed that the treatment began in March, 1904, and although the disease has now disappeared, it is still possible that it may recur.

A very large number of cases of cancer have been treated by radium in this country, on the Continent, and in America. Some have improved remarkably, but in most instances there has been no apparent benefit, and in no case has sufficient time elapsed to speak with certainty of cure. No surgeon would feel justified in reporting a cure of cancer until at least two years had passed without recurrence, and there are many instances on record where a longer period of apparent immunity has been followed by a re-appearance of the disease.

It must be remembered that the effect of radium upon a cancerous growth is, so far as we are at present aware, purely local. The terrible feature of cancer is the early involvement of the lymphatic glands, followed by the formation of secondary tumours in the internal organs. It is impossible to follow these internal developments by such a remedy as radium. Only too often a patient is found, on first seeking medical advice, to have already these secondary deposits, and treatment by local measures is purely palliative. That relief may be afforded in some cases which are beyond operation is recognised, but nothing has yet been reported which will warrant a surgeon using radium in a case of cancer where there is a possibility of complete removal by the knife.

Radium is applied in small tubes to the surface of a tumour, and in some cases it has been found possible to place it in the interior of a growth through a small incision. The quantities available are so minute that only a small area can be treated at one time. In the case of cancer mentioned above, the quantity which was used was ten milligrams. Fortunately the radium can be used again and again, for its energy appears practically to be inexhaustible.

#### NOTES.

SINCE the appearance in NATURE of April 6 of an article on the proposed amalgamation of the Society of Arts and the London Institution, a meeting of the proprietors of the London Institution has been held to consider the managers' proposals in connection with the amalgamation. The proposals met with a determined opposition from some proprietors; and after a somewhat noisy and undignified discussion, it was resolved to defer the further consideration of the scheme of amalgamation until after the annual meeting of the London Institution on April 28. The result of this meeting is to be regretted, since it implies the loss for the present of an excellent opportunity to accomplish the establishment of an important and powerful institute designed to develop a popular interest and regard for scientific work and results. It is to be hoped that it may prove possible to arrive at some agreement which will lead to the formation of a vigorous scientific organisation, in which the privileges offered by the Society of Arts and the London Institution will be combined.

THE Paris Geographical Society has awarded its gold medal to M. Paul Doumer.

It is intended, if found practicable, says the *Pioneer Mail*, to arrange for daily weather reports from the Andamans by wireless telegraphy.

THE death is announced of Prof. A. Piccini, professor of chemistry at the R. Istituto di Studi superiori, Florence, and author of several works on chemistry.

THE President of the Board of Agriculture and Fisheries has appointed a committee to inquire into the nature and causes of grouse disease, and to report whether any, and, if so, what, preventive or remedial measures can with advantage be taken with respect to it.

THE Paris correspondent of the *Times* announces the death of Colonel Renard, the director of the National Aërostatic Park at Meudon. The investigations and experiments of the Renard brothers have done much to promote the progress of aerial navigation.

It is announced that the Liège International Exhibition will be opened on Saturday, April 22, and that, unlike most exhibitions, the buildings will be complete. The exhibition will be of a very attractive and picturesque character, and the buildings cover a greater area than at any previous exhibition, except those of Paris in 1900 and of St. Louis. During the period of the exhibition several congresses will be held in Liège, that of mining and metallurgy, from June 26 to July 1, promising to be the most largely attended.

THE *Times* correspondent at Athens states that at the last meeting of the Archæological Congress, on April 13, it was decided that the present executive committee should continue to exist until the next meeting of the congress, which was fixed to take place at Cairo after a *minimum* interval of two years, the Egyptian Government having signified its willingness to accept this arrangement.

PRESS telegrams from Martinique report that Mont Pelée is again showing volcanic activity. On April 9-10 the escape of vapour was fairly abundant. On April 10-11 a marked recrudescence manifested itself; numerous small clouds issued from the vent, and there was a small flow of lava into the valley of the White River. On April 13-14 frequent rumblings were heard, and it was noticed that blocks of rock, accompanied by white clouds, were expelled from the south side of the crater.

MR. C. H. HAMILTON records in *Science* that the world-renowned volcano Kilauea, in the Hawaiian Islands, has again become active, after a rest of thirteen years. Fresh lava appeared the last week of February, heralded by a slight earthquake. On March 10 the Volcano House reported the existence of a large lake of lava. "Heavy rumblings and explosions indicate that another outbreak is imminent." Thus there seems to be a restoration of the old-time activity—such as will cause a large increase in the number of visitors.

DR. DAVISON states in a letter to the *Times* that a detailed record of the Indian earthquake was given by a horizontal pendulum at Birmingham. The first tremors were registered at 1h. 6m. 18s. a.m., and were succeeded at 1h. 29m. 2s. by long-period undulations lasting for more than an hour and a half. The more prominent of these undulations were in two series, separated by a few minutes, and little more than two hours later the diagram showed another double group of waves. The early tremors took a direct course through the body of the earth; the first double series travelled along the surface by the shortest way to Birmingham, while the second double series followed the longest possible route, through the antipodes, and back again to Birmingham.

It is announced in *Science* that Dr. Frank Schlesinger has been elected director of the New Allegheny Observatory. The observatory has an endowment fund, and a regular income from the time service, besides owning a large and valuable property in the City of Allegheny, which will become a source of income in the near future. Work has not been suspended on account of lack of funds, and much has been accomplished toward the instrumental equipment during the past year. The Keeler memorial telescope of 30-inch aperture is now ready to be set up, and the large (Porter) spectroheliograph is almost completed. The 30-inch objective is well under way, and other instruments will be installed during the year under the directorate of Dr. Schlesinger.

At the meeting of the Royal Colonial Institute, held on April 11, Sir Frederick Pollock read a paper on Imperial Organisation. He deprecated the national faculty of compromise, and asked, could we go on trusting to compromises and accidents? It is necessary to look, he continued, for some plan which will avoid elaborate legislature and formal change in the Constitution. We must be content for the present with a council of advice which will have only "persuasive authority." A permanent secretary's office is required, independent of any existing department, but immediately under the president of the Imperial council. The best living information ought to be at the service of this Imperial council through its secretariat; and this can be most effectively done, without ostentation and with very little expense, by the constitution of a permanent Imperial commission the members of which will represent all branches of knowledge and research, outside the art of war, most likely to be profitable in Imperial affairs. Not only learned and official persons would be included in such a body, but men of widespread business, travellers, ethnologists, comparative students of politics might all find scope for excellent work. It need not be paid work. It would be as willingly done without pecuniary reward as the more formal and laborious work of Royal Commissions, as to which there has never been any difficulty. Of the need for some such advisory council to secure national efficiency there can be no doubt, and it is earnestly to be desired that hopes and schemes, like

that of Sir F. Pollock, will soon fructify in accomplished fact. A select advisory council on which men of science familiar with the scientific advances of recent years took a prominent place would assist statesmen to secure national efficiency more than any other expedient.

REPORTS of the annual general meeting of the Chemical Society and of the anniversary dinner are given in the *Proceedings* of the society, just issued. The following extracts from the official account of remarks made at the dinner by Mr. R. B. Haldane, as to the neglect of science by the British nation in the past, and the promise of an improved position in the future, are of interest:—The problem which lay in front of the British nation was how to develop what he might call the grey matter of the executive brain. All the things spoken of that night represented something new in the nation, and not only something new, but something of which they would have to see a great deal more if the nation was to hold its own in these days. Science counted for more than ever it did. The West had had a rude awakening at the hands of the East. The controversies which agitated the minds of politicians were of less importance than the great question of how to make the permanent element in politics more powerful and better than it was. There was too little science in the present day, although one or two things had been done for which they were very grateful, in connection with the Navy and the Army and the Defence Committee. If they turned to the different departments of the Government there was hardly one which did not require science, if its policy was to be an effective policy. Wherever they turned science was needed, and yet there was not sufficient attraction to a man of high attainments to put himself at the disposition of the State. Foreign Governments held out careers far in excess of any rewards and honours which the British Government could afford. Was it impossible to see an era in which the head of the Government could have at his disposition the first intelligence and the best brains which the nation could command? If we were to hold our own we must not be behind Berlin, the United States, or the French nation. Science never stands still, and if science does not stand still, Governments cannot afford to stand still in their use of science. These were speculations which, perhaps, went beyond the moment, but he had a strong feeling that the time was very nearly, if not quite, ripe for them. They would see what was the mind of the nation on this point, and doubtless they would be subjected to the acute disappointment to which all were usually subjected when they formed great expectations. He hoped to see the position of science raised in the next few years, and he looked to the time when brute force would count for little, and knowledge for more.

WE have received from Messrs. R. Friedländer and Sons, of Berlin, a priced catalogue of books and papers dealing with vertebrate anatomy and physiology.

PART xxxi. of the *Transactions* of the Yorkshire Naturalists' Union contains the reports of that body for the years 1903 and 1904, and also a reprint of the excursion circulars for the same period. A satisfactory feature in the work of the union is the care devoted to the collection of photographs of important geological sections within its sphere of influence.

PROF. J. S. KINGSLEY discusses in the February number of the *American Naturalist* the current nomenclature and homology of the component bones of the lower jaw of reptiles, pointing out that there is still some uncertainty with regard to the proper determination of one of these

elements in crocodiles. The other articles are on natural and artificial parthenogenesis, by Dr. A. Petrunkevitch; on the angle of deviation from the vertical at which stems show the strongest geotropical response, by Miss Haynes; and on the variation in the ray-flowers of Rudbeckia, by Dr. R. Pearl.

In the April number of *Bird Notes and News* reference is made to certain common misapprehensions in regard to the authorities responsible for protective regulations, and it is pointed out that many of these emanate from county councils. To the agriculturist and the horticulturist it is, however, of little consequence whether the alleged over-protection of birds in his particular district is the work of the local or of the Imperial Parliament, for the difficulty of getting ordinances repealed appears as difficult in the one case as in the other. In the statement on p. 61 as to the sale of skins of "Argus pheasants from the Himalayas," it should have been pointed out that "Argus pheasant" is the trade name for the peacock pheasants (*Euplocamus*) of the Himalaya, the true Argus having a very different habitat.

THE following quotation in the February issue of the *American Naturalist* from a work by Messrs. Gilbert and Starks on the fishes of the two sides of the Isthmus of Panama has a very great interest from the point of view of distribution in general:—"The ichthyological evidence is overwhelmingly in favour of the existence of a former open communication between the two oceans, which must have become closed at a period sufficiently remote from the present to have permitted the specific differentiation of a very large majority of the forms involved. . . . All evidence concurs in fixing the date of that connection at some time prior to the Pleistocene, probably in the early Miocene." This agrees precisely with the conclusions drawn from the study of the fossil mammalian faunas of North and South America, which indicate that land communication between those two continents was interrupted during a considerable portion of the Tertiary epoch, and only re-established about the close of the Miocene or early part of the Pliocene epoch.

THE existence of an entirely distinct second family type of lancelets (Cephalochordata) is demonstrated by Dr. R. Goldschmidt in *Biol. Centralblatt* of April 1. It appears that in 1889 Dr. A. Günther described a lancelet obtained during the *Challenger* Expedition as a new species, under the name of *Branchiostoma pelagicum*, its special characteristic being the absence of a tentacle-apparatus. Although on this ground Gill proposed the new generic name *Amphioxides* in 1895, while Delage and Hérouard pointed out that if the character in question was not due to imperfection the creature indicated a distinct ordinal type, yet it has generally been allowed to remain in the type genus, as in Prof. Herdman's account of the group in the "Cambridge Natural History." The examination of twenty-six entire specimens obtained during the recent German deep-sea expedition enables Dr. Goldschmidt to state that *A. pelagicus*, together with two closely allied species, represents a distinct family of Cephalochordata, which may be distinguished from the typical family as follows:—Family Branchiostomatidae.—A peribranchial space; the ventrally-opening mouth surrounded by tentacles; gill-canal furnished throughout its diameter with lateral gill-slits. Family Amphioxidae.—No peribranchial space; the slit-like mouth opening on the left side; gill-slits situated in the ventral median line; gill-canal divided into a dorsal nutritive and a ventral respiratory half.

NO. 1851, VOL. 71]

*Indian Public Health* for March (vol. i. No. 8) contains articles on septic tank installations in Bengal, sewage disposal in India, Hankin's views on plague epidemiology, the Finsen method, &c.

IN the *Revue scientifique* (April 8) M. Calmette, the director of the Pasteur Institute, Lille, writes on the important rôle played by medical science in the successful colonisation of tropical countries, instancing such diseases as cholera, leprosy, plague, and malaria, which can be robbed of their terrors only by the institution of efficient sanitary control in the districts in which they occur.

MAJOR RONALD ROSS, F.R.S., in a letter to the *Times* (April 7) directs attention to the remarkable diminution in malarial disease which has accompanied the institution of anti-mosquito measures at Klang and Port Swettenham in the Federated Malay States. The former, with a population of 3576, and the latter of about 700, were both perfect hotbeds of malaria, and in 1901, for the two towns, 236 sick certificates and 1026 days of leave were granted. In 1902, after anti-mosquito measures had been energetically pursued, the figures were 40 and 198, and in 1904 these had further fallen to 14 and 71 respectively. Dr. Malcolm Watson, district surgeon, from whose report these statistics are taken, sums up by saying:—"In whatever direction one turns, it is plain that the two areas which were so malarious in 1901 are now practically, if not absolutely, free from the disease, and that the district surrounding these two areas remains much as it was." These anti-mosquito measures were initiated by the Department for Medical Research, Federated Malay States (which is affiliated with the London School of Tropical Medicine), under the direction of Dr. Hamilton Wright.

IN a short paper which appeared in the *Botanical Gazette* (February) Mr. C. H. Chamberlain advances the opinion that an alternation of generations as understood by botanists for plants can be recognised in animals. The egg with the three polar bodies constitutes a generation comparable with the female gametophyte in plants; similarly, the primary spermatocyte with the four spermatozoa constitute a generation comparable with the male gametophyte in plants. All other cells of the animal constitute a generation comparable with the sporophytic generation in plants.

Two debated points connected with the problems of geotropism in plants, *i.e.* the seat of geotropic sensibility, and the statolith theory simultaneously advanced by Haberlandt and Němec, form the subject of a critical review by Dr. Linsbauer, who writes in *Naturwissenschaftliche Wochenschrift* (March, No. 11). The reviewer may be regarded as an adherent to the statolith theory, and notes that although the rôle of statoliths is generally attributed to starch grains, in their absence other bodies, such as crystals of calcium oxalate, or certain bright bodies found in the rhizoids of *Chara*, may function similarly.

THE *Bulletin* of the American Geographical Society contains an article on the work of the Reclamation Service of the United States, by Mr. C. J. Blanchard. During the last three and a half years a sum of nearly twenty-five million dollars has been realised from the sale of public lands, and work has been begun on eight irrigation projects which will make an area of about one million acres productive. The *National Geographic Magazine* for March has a short article, with excellent illustrations, on the same subject.



MESSRS. W. STANFORD AND CO., of Oxford, have sent us specimens of a number of outline maps of the world, on Mollweide's equal-area projection; also a map of the Atlantic Ocean, on the same projection. The maps are well drawn and clearly printed; the larger scale maps should be extremely useful for purposes of research and teaching, while the smaller maps are well adapted for museum use. The employment of equal-area maps in representing distribution cannot be too strongly recommended, and in providing such maps at very moderate prices Messrs. Stanford have done good service.

In ore-dressing operations and in laboratory work much confusion is caused by the practice of describing the sieve or screen employed by the number of the mesh. A sieve of 30 mesh, for example, does not possess an aperture of one-thirtieth of an inch, nor does it yield a product of which the largest particles will be one-thirtieth of an inch in diameter. With coarse sieves the error is not of great moment, but with fine sieves the wire itself occupies so much space that the size of the particle passed by the sieve may vary from a quarter to two-thirds of the size indicated by the word "mesh." Consequently, in ordering wire screens or in recording results it is desirable to specify the size of aperture rather than the number of the mesh. In order to enable this to be done, Mr. G. T. Holloway has drawn up a valuable series of tables, calculated on the British Imperial Standard wire gauge, showing the size of aperture in screen wire cloth of all the principal sizes in use down to the very finest. The tables have been duplicated, one series showing the figures in decimals of an inch, and the other, for the use of those who still prefer to employ vulgar fractions, in both decimals and vulgar fractions. The tables, which have been published in pamphlet form (*Bulletin* No. 5 of the Institution of Mining and Metallurgy), have been calculated with great care, and should do much towards effecting uniformity in the nomenclature of sieve-mesh.

THE Geological Survey of Western Australia is publishing, in handy octavo form, a valuable series of bulletins, of which we have received three. One of them, dealing with the mineral production of the colony up to the end of 1903, is written by Mr. A. Gibb Maitland and Mr. C. F. V. Jackson. It shows that the total value of the mineral products was 47,779,000*l.*, gold alone representing a value of 46,441,000*l.* Other minerals mined include copper, tin, lead, silver, iron, antimony and cobalt ores, coal, graphite, limestone, precious stone, mica, asbestos, and salt. In the other bulletins Mr. C. G. Gibson deals with the mineral resources of the Murchison goldfield and of Southern Cross, Yilgarn goldfield. The reports and the accompanying coloured maps throw much light on the geology of the districts, and indicate that the areas described deserve more attention from the mining prospector than they have hitherto received. The Murchison goldfield is of some historical interest in that in 1855, when its economic value was purely prospective, it was officially stated to have the appearance of being one of the finest goldfields in the world. Although it has not come up to these high expectations, it is one of the most important goldfields in the colony, and contains not only one of the largest quartz veins mined anywhere, but also the iron ore deposits of the Weld range, which, though practically valueless owing to their inaccessibility, are among the richest in the world.

MR. V. KOUSNETZOFF communicated to the *Bulletin* of the St. Petersburg Academy of Sciences of September last some useful formulæ for the determination of the height

of aurora borealis. He also gave tabular and graphical results of its occurrence at Pavlovsk from January 1, 1878, to the end of 1903. The tables show, generally, an eleven years' period, as in the case of sun-spots, but the details of the two curves do not correspond. The maxima of the auroræ occurred in 1887 and 1896, and the minima in 1884 and 1894, but this divergence may be due to the occurrence of cloud. The annual period is well marked, the maxima being in March and October, and the minima in January and July.

In the *Archives des Sciences physiques et naturelles* of March last M. F. A. Forel summarises his own observations and those made by others on the occurrence of Bishop's Ring, following the great volcanic eruption of Mont Pelée (Martinique) on May 8, 1902. Bishop's Ring, as most of our readers are aware, consists of a solar corona of great diameter; it appears to be formed of two parts, a limb of a dazzling silvery hue being immediately round the sun, and, beyond this, a coppery red ring of some 20°-25° exterior radius. The ring appears to have been first observed in the winter of 1902-3, but only became general towards the end of July, 1903, and was constantly seen until November of that year. After that time it became less frequent, and ceased altogether in July, 1904. The phenomenon is best seen from an elevated station, and when the sun is high above the horizon. The intensity of the colours of the ring was less than in that which followed the Krakatoa eruption in 1883.

*Bulletin* No. 35 of the United States Department of Agriculture, Weather Bureau, will be found of great interest to those who wish to know something about the present stage of long-range weather forecasting. The first chapter is written by Prof. Garriott, and presents a verification of the work of the most prominent of the so-called long-range weather forecasters in the United States. Prof. Garriott considers chapter and verse of the forecast with the actual facts, and shows conclusively the fallacy of these predictions. Prof. Woodward, in the second chapter, devotes his attention to the impossibility of basing weather predictions on planetary influences, and at the same time criticises the work of Mr. Tice embodied in a book on the elements of meteorology. Perhaps the most interesting portions of this *Bulletin* are the pages devoted to a discussion by Prof. Garriott of the subject of long-range forecasting by many of the leading meteorologists of the world. It may be said to be a brief review of the literature on the subject, and gives quotations of their opinions regarding the practicability of long-range work. At the end is given a summary of the remarks and opinions expressed and a series of conclusions based on them, and we refer the reader to the *Bulletin* for these conclusions. There is one which may be mentioned here, since by recent work in this country it has been brought prominently forward. "Advances in the period and accuracy of weather forecasts depend upon a more exact study and understanding of atmospheric pressure over great areas and a determination of the influences, probably solar, that are responsible for normal and abnormal distributions of atmospheric pressure over the earth's surface."

No. 3 of vol. ii. of *Le Radium* contains useful articles on uraniferous minerals and their deposits, and on the methods used in the measurement of the quantity of heat evolved by radio-active substances.

PROF. McCLELLAND has recently shown that the emanation of radio-active substances does not carry an electrical charge, and the same conclusion is arrived at by means

of a different form of apparatus by Prof. Battelli and F. Maccarrone (*Physikalische Zeitschrift*, No. 6). It must be concluded, therefore, contrary to M. Becquerel's views, that such emanations consist neither of fragments of atoms which have lost positive ions nor of the positive ions themselves.

A NEW method for the preparation of paraffins from their monohalogen derivatives which is described by M. Paul Lebeau in the current number of the *Comptes rendus* (April 10), is noteworthy on account of the simplicity of the reaction and the purity of the gas obtained. Sodium is converted into sodium-ammonium by the action of liquid ammonia, and this, treated with methyl chloride, gives methane, readily obtained in a pure state by liquefaction by means of liquid air. Ethyl and propyl iodides react with the same ease, giving rise to ethane and propane, the purity of which was verified by combustion analysis. It is pointed out by M. Lebeau that as these reactions take place below the boiling point of liquid ammonia there is small probability of any secondary reactions taking place.

THE current number of the *Quarterly Review* contains an article by Mr. A. E. Shipley on "Pearls and Parasites."

WE have received from Messrs. Isenthal and Co. a well illustrated and conveniently arranged catalogue of technical and laboratory electric measuring instruments and rheostats.

THE issue of the *Journal* of the Royal Sanitary Institute for April contains a full account of the papers read and the speeches delivered at the conference on school hygiene held at the University of London in February last, and reported in *NATURE* for February 16 (p. 377).

MANY characteristic scenes of the western coast and fjords of Norway are described and illustrated in a pamphlet just issued by the Albion Steamship Co., Ltd., Newcastle-on-Tyne, as an itinerary of cruises to be taken this year by the yachting steamer *Midnight Sun*.

MESSRS. JOHN J. GRIFFIN AND SONS, LTD., have published a ninth edition of their illustrated and descriptive catalogue dealing with apparatus suitable for the practical study of sound, light, and heat. An examination of the contents of the catalogue shows that a great improvement is taking place in the apparatus employed in the laboratories and lecture-rooms where physics is taught. Teachers and others should find this catalogue helpful and suggestive.

### OUR ASTRONOMICAL COLUMN.

ASTROPHYSICAL WORK AT THE SMITHSONIAN INSTITUTION.—Prof. Langley's report of the work performed in the various departments of the Smithsonian Institution during the year ending June 30, 1904, contains a report by Mr. C. G. Abbot of the observations made in connection with the solar radiation at the astrophysical observatory.

Among many items of interest, the following may be briefly mentioned:—The bolometer apparatus has now been improved to such a state of perfection that a duplicate set for investigating the radiation of stars has been constructed. A series of experiments with the improved pyroheliometer has shown that this instrument may now be used with confidence to measure the solar radiation.

The definition of the long focus mirror has been considerably improved by churning the air inside the tube, by protecting the tube from the direct solar rays with a covering of canvas, by employing a number of supporting plates as suggested by Prof. Ritchey in order to preserve the shapes of the mirrors, and by nullifying the vibrations due to traffic by placing indiarubber pads behind the mirrors. Prior to these alterations the solar image was

ill-defined; different parts of it came in focus in different planes, whilst the variation in the focal length of the instrument often amounted to 10 feet during a single day. Now the image is much better defined; all parts of it are focused in the same plane, and the focal length never varies so much as 12 inches during a day.

Well marked variations, amounting to 10 per cent. of the total, have been recorded in the value of the solar radiation, and Mr. Abbot expresses a strong hope that, on combining the solar radiation and atmospheric transparency results, long range climate forecasting will ere long become possible.

VALUE OF THE ASTRONOMICAL REFRACTION CONSTANT.—The third volume of the *Publications* of the Granducal Observatory at Heidelberg contains 234 pages devoted to the discussion of the results obtained by M. L. Courvoisier in a research undertaken by him for the determination of the refraction constant.

The instrument employed was a 6-inch Repsold meridian circle, which, together with its various constants, is described at length. Two hundred stars were observed, and the observations and their peculiar errors are discussed. The meteorological data for several periods during each observing day are next given, the observations extending from June 3, 1899, to July 9, 1901, and this table is followed by sections dealing with the stellar, latitude, and declination observations respectively.

The value obtained for the refraction constant is  $60''.161 \pm 0''.037$ .

REALITY OF VARIOUS FEATURES ON MARS.—In No. 4007 of the *Astronomische Nachrichten* Signor V. Cerulli, of Teramo, discusses the actual subjectivity of various Martian phenomena, as seen in the telescope, from a physiological standpoint. Having observed Mars regularly for ten years, he appears to have arrived at the conclusion that the actual existence of these features is as much a subject for physiological as for astronomical investigation. He states that the phenomena observed are so near to the limit of the range of the human eye that in observing them one really experiences effects accompanying "the birth of vision." That is to say, the eye sees more and more as it becomes accustomed, or strained, to the delicate markings, and thus the joining up of spots to form "canals" and the gemination of the latter follow as a physiological effect, and need not necessarily be subjective phenomena seen by the accustomed eye.

STONYHURST COLLEGE OBSERVATORY.—In addition to the results of the meteorological and magnetic observations made during 1904, Father Sidgreaves's annual report briefly refers to the solar and stellar spectroscopical work carried out at Stonyhurst during last year.

Two series of spectrograms of  $\beta$  Aurigæ and  $\gamma$  Cassiopeiæ were commenced, and the results already obtained are very promising. A short table showing sun-spot areas and the range of the magnetic declination appears to confirm the connection between these two values for the years 1898-1904. The spectra of sun-spots in the green and violet regions have been photographed with a Rowland grating spectroscope, and a number of experiments have been made with the view of photographing the spot spectra in the red region.

NATURE OF SUN-SPOTS.—In the April number of the *Bulletin de la Société astronomique de France* Abbé Th. Moreux re-discusses his theory concerning the formation and nature of sun-spots in the light of data more recently acquired, more especially during the great spot of February last. He gives numerous drawings of this spot, and several schematic diagrams showing the possible arrangement of the photospheric clouds in and over the spot, and arrives at the conclusion that spot areas are analogous to anti-cyclonic areas in the terrestrial atmosphere.

INSTRUCTIONS TO SOLAR OBSERVERS.—Amateur observers of solar phenomena will find the instructions to solar observers, formulated by the "commission solaire" of the Société astronomique de France, of great use and interest. Chapter v. is published in the April *Bulletin* of the society, and deals with daily spectroscopic observations of the chromosphere and prominences by the Lockyer-Janssen method.